

DETAILED ACTION

1. This office action is in response to communication filed on 2/25/09. Claim 8 has been added. Claims 1-8 are pending on this application.

Response to Arguments

2. Applicant's arguments filed 2/25/09 have been fully considered but they are not persuasive.

Response to Remarks

Regarding claim 1, applicant asserts that the teaching of Xiao is different from claim 1 in that claim 1 recites spreading codes that are used in communication so as to be orthogonal on the frequency and/or time axis whereas Xiao describe Walsh codes on the frequency axis are multiplied by Walsh codes on the time axis yielding two-dimensional orthogonal codes (Remarks page 5 last paragraph).

Examiner respectfully disagrees.

It is first noted that Walsh codes are well known in the art to be used as spreading codes. Xiao was relied up to teach spreading codes which are orthogonal at least in only N chips on the time axis and/or in only M chips on the frequency axis (page 1224 right side second paragraph).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., adaptively assigning despreading codes by considering fluctuation of propagation

paths on the frequency and time axis) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Also regarding claim 1, applicant asserts that modifying the background of the specification with Xiao would render the system inoperable for its intended purpose (Remarks page 6 second paragraph).

Examiner respectfully disagrees.

In response to applicant's argument, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Additionally, applicant asserts that there is no motivation to combine the background and Xiao (Remarks page 7 second paragraph).

Examiner respectfully disagrees.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention

where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the use of orthogonality may not increase the capacity of the conventional system of the background. However it is well known in the art that Walsh codes provide orthogonal spreading in such a way that only the receiver with the same code can recover it. This utilization of orthogonality significantly reduces interference between signals.

Furthermore, applicant asserts that using orthogonality to reduce interference between signals would not be sufficient to show obviousness since a solution would fail to account for fluctuation on the frequency or time axis (Remarks page 8 first paragraph).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., accounting for fluctuation on the frequency or time axis) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Regarding claim 3, applicant asserts that the combination of the background, Xiao, and Uesugi would not be obvious because it would be using the function of

Uesugi for a purpose other than what it was intended for (Remarks page 10 first paragraph).

Examiner respectfully disagrees.

The purpose of Uesugi is to maintain orthogonality of codes even when spreading factors are different (§0055 of Uesugi). This is achieved by monitoring the fluctuation of the time axis direction (§0054 of Uesugi). Uesugi was relied upon in the previous office action to teach the limitation in claim 3 of "detecting whether *either* of channel fluctuation on the frequency axis of *channel fluctuation on the time axis* is prominent". Xiao was relied upon to teach assigning orthogonal spreading codes (see the previous office action). However Uesugi teaches assigning two-dimensional spreading codes (§0050 of Uesugi) in which the codes are orthogonal (§0051 of Uesugi). The assigning of orthogonal spreading codes taught by Uesugi is similar to the language recited in claim 3 of the current application and therefore interpreted to be obvious. Furthermore, Xiao was not relied upon to teach assigning codes based on channel fluctuation. Uesugi was relied upon to teach that limitation.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over the background of applicant's specification (hereby referred to as the background) in view of Xiao et al ("A Novel MC-2D-CDMA Communication Systems and Its Detection Methods" 2000 IEEE International Conference on Communications, Publication Date: 2000 Volume: 3, On page(s): 1223-1227).

Re claim 1, the background teaches a radio transmitter-receiver wherein a pilot symbol that has undergone M-chip spreading on a frequency axis (the vertical axis in fig. 2) and N-chip spreading on a time axis (the horizontal axis in fig. 2) by means of a spreading code having an $M \times N$ chip length (page 3 line 26 – page 4 line 2) where M and N are any integers greater than or equal to 2 (fig. 2, page 3 line 26 – page 4 line 2) is used in the transmitter (it is well known that spreading codes are used in the transmitter portion of a system), and in the receiver, a spreading code that is not used in spreading a pilot signal is used as a despreading code to despread a received signal and then estimate noise and interference power (page 2 lines 18-21. One of ordinary skill in the art would have found it obvious to implement CDMA techniques in a MC-2D-CDMA system, which is based on CDMA).

The background fails to teach wherein said spreading code that is used in spreading a pilot symbol and said despreading code that is used in despreading are assigned so as to be orthogonal at least in only N chips on the time axis and/or in only M chips on the frequency axis. However Xiao teaches spreading codes which are orthogonal at least in only N chips on the time axis and/or in only M chips on the frequency axis (page 1224 right side second paragraph).

Therefore taking the combined teachings of the background and Xiao as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the feature of Xiao into the apparatus of the background. The motivation to combine Xiao and the background would be to provide higher capacity (page 1223 left side third paragraph of Xiao). Furthermore it is well known that utilizing orthogonality reduces interference between signals.

Re claim 2, the modified invention of the background teaches a radio transmitter-receiver wherein at least one of code that is orthogonal to said despreading code that is used in despreading even if only in M chips on the frequency axis and/or code that is orthogonal to said despreading code that is used in despreading even if only in N chips on the time axis (page 1224 right side second paragraph of Xiao) is preferentially assigned as said spreading code that is used in spreading pilot symbols (page 1224 right side second paragraph of Xiao. The Walsh code is a spreading code).

Re claim 7, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 1. It would be obvious and necessary to have a method of using the apparatus as claimed in claim 1.

Re claim 8, the modified invention of the background teaches a radio transmitter-receiver wherein the spreading code is at least one of a plurality of orthogonal spreading codes (page 1224 right side second paragraph of Xiao. The two dimensional

orthogonal spreading code is realized by multiplying the codes on the time and frequency axis. Since there may be a different code on the frequency axis, it is interpreted that there is more than one orthogonal spreading code).

3. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over the background of applicant's specification (hereby referred to as the background) and Xiao et al ("A Novel MC-2D-CDMA Communication Systems and Its Detection Methods" 2000 IEEE International Conference on Communications, Publication Date: 2000 Volume: 3, On page(s): 1223-1227) in view of Uesugi et al (US20040042386).

Re claim 3, the modified invention of the background fails to teach a radio transmitter-receiver comprising:

means for detecting whether either of channel fluctuation on the frequency axis or channel fluctuation on the time axis is prominent; wherein:

code that is orthogonal even if only in M chips on the frequency axis is assigned as said spreading code that is used in spreading a pilot symbol when channel fluctuation is prominent on the time axis; and

code that is orthogonal even if only in N chips on the time axis is assigned as said spreading code that is used in spreading a pilot symbol when channel fluctuation is prominent on the frequency axis.

However Uesugi teaches detecting whether either of channel fluctuation on the frequency axis or channel fluctuation on the time axis is prominent (¶0051, ¶0054. The symbol portion of the frequency and time axis is maximum. Reduced orthogonality of time axis direction under intensive time fluctuation) wherein:

code that is orthogonal even if only in M chips on the frequency axis is assigned as said spreading code that is used in spreading a pilot symbol (page 1224 right side second paragraph of Xiao) when channel fluctuation is prominent on the time axis (¶0051. The symbol portion of the time axis is maximum); and

code that is orthogonal even if only in N chips on the time axis is assigned as said spreading code that is used in spreading a pilot symbol (page 1224 right side second paragraph of Xiao) when channel fluctuation is prominent on the frequency axis (¶0051. The symbol portion of the time axis is maximum).

Therefore taking the modified teachings of the background and Xiao with Uesugi as a whole, It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the feature of Uesugi into the apparatus of the background and Xiao. The motivation to combine the background, Xiao, and Uesugi would be to optimize the axis direction of every code while maintaining orthogonality (¶0054 of Uesugi).

Re claim 4, the modified invention of the background teaches a radio transmitter-receiver wherein delay spread is used as an index of channel fluctuation on the frequency axis (¶0054 of Uesugi, the long delay wave is interpreted to be a delay spread).

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the background of applicant's specification (hereby referred to as the background), Xiao et al ("A Novel MC-2D-CDMA Communication Systems and Its Detection Methods" 2000 IEEE International Conference on Communications, Publication Date: 2000 Volume: 3, On page(s): 1223-1227) and Uesugi et al (US20040042386) in view of Sudo (US20040071078).

Re claim 5, the modified invention of the background fails to teach a radio transmitter-receiver wherein a coherent band is used as an index of channel fluctuation on the frequency axis.

However Sudo teaches wherein a coherent band is used as an index of channel fluctuation (¶0423, the coherent detection is interpreted to correspond to a coherent band) on the frequency axis (¶0431).

Therefore taking the modified teachings of the background, Xiao, and Uesugi with Sudo as a whole, It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the feature of Sudo into the apparatus of the background, Xiao, and Uesugi. The motivation to combine the background, Xiao,

Sudo and Uesugi would be to improve the error rate characteristic with almost no lowering of transfer efficiency (§0424 of Sudo).

5. Claim 6 rejected under 35 U.S.C. 103(a) as being unpatentable over the background of applicant's specification (hereby referred to as the background), Xiao et al ("A Novel MC-2D-CDMA Communication Systems and Its Detection Methods" 2000 IEEE International Conference on Communications, Publication Date: 2000 Volume: 3, On page(s): 1223-1227) and Uesugi et al (US20040042386) in view of Sumasu et al (US20040028007).

Re claim 6, the modified invention of the background fails to teach a radio transmitter-receiver wherein Doppler frequency is used as an index of channel fluctuation on the time axis.

However Sumasu teaches wherein Doppler frequency is used as an index of channel fluctuation (page 7, claim 8) on the time axis (page 6, claim 1).

Therefore taking the modified teachings of the background, Xiao, and Uesugi with Sumasu as a whole, It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the feature of Sumasu into the apparatus of the background, Xiao, and Uesugi. The motivation to combine the background, Xiao, Sumasu and Uesugi would be to minimize the occurrence of burst errors (§0026 of Sumasu).

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEON-VIET Q. NGUYEN whose telephone number is (571)270-1185. The examiner can normally be reached on Monday-Friday, alternate Friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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